

7. FACILITY REQUIREMENTS

This chapter describes the system needs required to accommodate forecast demand through the 20-year planning period ending in year 2020. The facility needs for commercial service airports were coordinated with each airport sponsor to ensure consistency with their Master Plan, airport layout plan, and 6-year plan. The facility requirements for general aviation airports were calculated for this report and reviewed by each airport sponsor. Changes were made to reflect special circumstances, as appropriate.

System Needs Analysis

System requirements were developed by comparing estimated current and future requirements to existing facilities. Separate facility requirements were developed for horizon years 2000, 2005, and 2020. Analyses were performed for general aviation airports for following functional areas:

- › • Airport Capacity
- › • Primary Runway Length and Width
- › • Taxiway
- › • Aircraft Storage/Parking
- › • Apron Area
- › • Auto Parking
- › • Terminal Building
- › • NAVAIDS

Facility requirements were developed using standard planning parameters and relationships that are appropriate for macro-level analysis and system planning. Planning parameters for runway length and width, taxiway type, apron areas, T-hangar units, conventional hangar, and auto parking were based on FAA standards and other applicable guidelines. For general aviation terminal areas, space requirements were derived from the Virginia Department of Aviation terminal program data.

Circumstances at individual airports will differ from the standards used for this analysis and specific considerations may justify a level of facility development that could exceed or materially differ from the projections described in the enclosed sheets. The statewide projections will not eliminate or replace the need or validity of individual airport planning efforts, and those planning efforts will continue to have central importance in the Commonwealth's funding decisions in relation to specific projects.

Nevertheless, it is important from a system perspective that the forecasts of individual airport facility requirements provide a reasonable estimate of overall system facility and capital requirements for the near

and long-term horizons. Moreover, this chapter addresses facility requirements developed at a level appropriate for a state system plan, and represents a fiscally unconstrained condition.

Airport Capacity – Annual Service Volume

FAA Advisory Circular 150/5060-5, Airport Capacity and Delay, was used to estimate the ASV of each airport. Annual Service Volume (ASV) is an FAA capacity measure that provides a reasonable estimate of the capacity of an airport on an annual basis, and is useful for long-range planning. It accounts for differences in runway use, aircraft mix, weather conditions, etc., that would reasonably be encountered over a year's time. For the purpose of this analysis, a mix index of 0-20 was assumed for all GA airports. Consequently, the ASV for most GA airports is 230,000 operations. Manassas Regional is an exception due to their runway configuration which allows independent operations on more than one runway.

For planning purposes, industry practice suggest that at 60 percent of capacity, an airport should begin planning for capacity improvements. It is further recommended that at 80 percent of capacity, the improvements should be in place and operational.

The ASV can be exceeded, sometimes by significant amounts, with corresponding increases in delay. As the number of annual aircraft operations approach the ASV of an airport's airfield, average annual aircraft delays increase rapidly with relatively small increases in aircraft operations. As shown in Table 1, there is substantial surplus capacity at most Virginia airports throughout the planning period. However, notable exceptions include Newport News-Williamsburg International, Norfolk International and Richmond International airports.

Estimates of past capacity levels at Washington Dulles International Airport and Ronald Reagan Washington National Airport reflected hourly capacity, and were taken from the FAA's *Airport Capacity Benchmark Report 2001*.

Table 1

Annual Service Volume

Airport Name	Airport Identifier	Service Role	ASV	2005 Forecast Operations	2005 Capacity Level	2020 Forecast Operations	2020 Capacity Level
Charlottesville-Albemarle	CHO	CM	195,000	90,902	47%	128,468	66%
Lynchburg Regional	LYH	CM	200,000	63,488	32%	86,993	43%
Newport News-Williamsburg International	PHF	CM	219,000	226,521	103%	278,056	127%
Norfolk International	ORF	CM	190,000	152,213	80%	178,257	94%
Richmond International	RIC	CM	250,000	165,524	66%	214,391	86%
Roanoke Regional	ROA	CM	230,000	113,832	49%	146,473	64%
Ronald Reagan Washington National	DCA	CM	(1)	343,892	(1)	333,342	(1)
Shenandoah Valley Regional	SHD	CM	195,000	23,023	12%	31,244	16%
Washington Dulles International	IAD	CM	(1)	571,535	(1)	804,356	(1)
Chesapeake Regional	CPK	RL	230000	30,171	13%	39,963	17%
Chesterfield County	FCI	RL	230000	54,796	24%	66,689	29%
Hampton Roads	PVG	RL	230000	59,299	26%	72,399	31%
Hanover County Municipal	OFP	RL	230000	29,774	13%	41,116	18%
Leesburg Executive	JYO	RL	230000	94,325	41%	133,359	58%
Manassas Regional	HEF	RL	355000	137,604	39%	168,298	47%
Stafford Regional (New)	RMN	RL	230000	17,775	8%	30,798	13%
Warrenton-Fauquier	W66	RL	230000	40,759	18%	51,488	22%
Accomack County	MFV	GR	230000	11,903	5%	20,194	9%
Blue Ridge	MTV	GR	230000	22,709	10%	25,392	11%
Culpeper County	CJR	GR	230000	51,626	22%	83,479	36%
Danville Regional	DAN	GR	230000	17,506	8%	23,083	10%
Dinwiddie County Airport	PTB	GR	230000	37,191	16%	54,694	24%
Farmville Regional	FVX	GR	230000	10,642	5%	14,232	6%
Ingalls Field	HSP	GR	230000	3,925	2%	8,827	4%
Lonesome Pine	LNP	GR	230000	8,977	4%	10,636	5%
Mecklenburg-Brunswick Regional	AVC	GR	230000	7,251	3%	13,076	6%
Middle Peninsula Regional	W97	GR	230000	14,523	6%	25,077	11%
New River Valley	PSK	GR	230000	9,105	4%	9,995	4%
Shannon	EZF	GR	230000	53,294	23%	62,367	27%
Suffolk Municipal	SFQ	GR	230000	35,233	15%	51,720	22%
Tazewell County	6V3	GR	230000	4,953	2%	5,515	2%
Virginia Highlands	VJI	GR	230000	23,500	10%	26,061	11%
William M. Tuck	W78	GR	230000	7,220	3%	7,925	3%
Winchester Regional	OKV	GR	230000	34,507	15%	50,429	22%
Blackstone Municipal	BKT	GC	230000	3,402	1%	4,531	2%
Brookneal-Campbell County	0V4	GC	230000	760	0.3%	834	0.4%
Emporia-Greenville Regional	EMV	GC	230000	1,135	0.5%	1,246	1%
Franklin Municipal	FKN	GC	230000	4,829	2%	6,237	3%
Front Royal-Warren County	FRR	GC	230000	11,654	5%	18,710	8%
Lee County (New)		GC	230000	-	0%	8,091	4%
Louisa County	LKU	GC	230000	17,889	8%	33,892	15%
Luray Caverns	W45	GC	230000	3,420	1%	3,754	2%
Marks Municipal	W63	GC	230000	1,520	1%	1,668	1%
Mountain Empire	MKJ	GC	230000	10,136	4%	11,159	5%
New Kent County	W96	GC	230000	14,971	7%	16,489	7%
Orange County	OMH	GC	230000	8,355	4%	9,171	4%
Tangier Island	TGI	GC	230000	1,000	0.4%	1,000	0.4%
Tappahannock-Essex Co. (New)		GC	230000	-	0%	14,359	6%
Twin County	HLX	GC	230000	7,485	3%	12,084	5%

Table 1

Annual Service Volume

Airport Name	Airport Identifier	Service Role	ASV	2005 Forecast Operations	2005 Capacity Level	2020 Forecast Operations	2020 Capacity Level
Virginia Tech	BCB	GC	230000	15,464	7%	20,779	9%
Wakefield Municipal	AKQ	GC	230000	13,627	6%	23,993	10%
Williamsburg-Jamestown	JGG	GC	230000	24,120	10%	35,074	15%
Bridgewater Air Park	VBW	LO	230000	11,534	5%	12,877	6%
Chase City Municipal	CXE	LO	230000	2,185	1%	3,337	1%
Crewe Municipal	W81	LO	230000	3,985	2%	4,999	2%
Falwell	W24	LO	230000	7,188	3%	10,273	4%
Gordonsville Municipal	GVE	LO	230000	7,308	3%	13,337	6%
Grundy Municipal	GDY	LO	230000	3,979	2%	4,993	2%
Hartwood Field	8W8	LO	230000	4,653	2%	6,733	3%
Hummel Field	W75	LO	230000	15,881	7%	23,861	10%
Lake Anna	7W4	LO	230000	380	0.2%	417	0.2%
Lawrenceville-Brunswick	LVL	LO	230000	2,280	1%	3,754	2%
Lee County	PTG	LO	230000	2,470	1%	-	n/a
Lunenburg County	W31	LO	230000	380	0.2%	417	0.2%
New London	W90	LO	230000	26,458	12%	41,955	18%
New Market	8W2	LO	230000	14,232	6%	18,724	8%
Smith Mountain Lake	W91	LO	230000	4,920	2%	5,402	2%
Tappahannock Municipal	W79	LO	230000	6,270	3%	-	n/a
Waynesboro	W13	LO	230000	12,176	5%	13,542	6%

1) Washington Dulles International (IAD) and Ronald Reagan Washington National (DCA) Airports calculate hourly rather than annual capacity. The FAA's *Airport Capacity Benchmark Report 2001* reports the hourly capacity for DCA as 76-80 operations and the hourly capacity for IAD as 120-121 operations.

Source: HNTB Analysis

Primary Runway Length and Width

Although it is recognized that there is substantial value in multiple runways, for the purpose of this analysis, physical constraints were not considered, and only the primary runway was considered for the purpose of determining state airfield recommended improvements.

Minimum Runway length recommendations for each general aviation airport were derived by using the greater of:

- › Minimum runway length recommendations were calculated in accordance with FAA Advisory Circular 150/5300-13 Change 6, *Airport Design*. Minimum runway lengths are a function of airport elevation, and average high temperature, and are based on serving 95 percent of small airplanes with less than 10 passenger seats. Actual runway length requirements may exceed the minimums presented in this analysis. Elevation data was taken from the inventory survey and supplemented by Airport Layout Plan data, as necessary. Average high temperatures were calculated for each of the state's five climatic regions¹⁰ using data from The Virginia State Climatology Office.
- › Runway lengths to accommodate business jets were derived from the FAA Southern Region (ADO) policy (approved by the FAA Washington Airports District Office) which states that a minimum runway length of 5,500 feet should be considered for those airports with greater than 500 annual jet operations.¹¹
- › Existing runway dimensions.
- › Local Service airports are not eligible for state or federal funding; therefore, the runway length and width standards for Local Service airports reflect minimum Commonwealth standards.

Consequently, those airports with greater than 500 annual jet operations have a recommended minimum runway length of at least 5,500 feet, while airports with less than 500 annual jet operations have a recommended minimum runway length determined according the methodology in FAA Advisory Circular 150/5300-13 Change 6, *Airport Design*, or the existing runway length, if greater than that calculated using the FAA methodology.

Assuming that nominal deficiencies would not be remedied, Tables 2 and 3 reflect those runway length deficiencies greater than or equal to 500 feet. Only 2005 recommended improvements are shown because there are no runway improvements anticipated between 2005 and 2020. Any general aviation airports that are forecast to have greater than 500 jet operations during the 20-year planning period (or are forecast to require additional runway length), will require the additional runway by 2005.

¹⁰ Virginia's five climatic regions include Tidewater, Piedmont, Northern Virginia, Western Mountain, and Southwestern Mountain.

¹¹ Regional Guidance Letter RGL 00-1, *Standard Development for Business Jet Aircraft*, January 28,2000.

Table 2 also compares existing runway widths for each airport to the minimum standards in Advisory Circular 150/5300-13 Change 6, *Airport Design* for the purpose of determining state recommended improvements. Actual airport-specific runway width requirements may exceed the minimums presented in this analysis.

Table 2

Primary Runway Length - Commercial Service Airports

Airport Name	Service Role	Approach Category	Design Group	Primary Runway	Existing Primary Runway Length (ft)	2005 Master Plan Recommended Runway Length (ft)	2020 Master Plan Recommended Runway Length (ft)	2005 Runway Master Plan Recommended Extension (ft) (1)	2020 Runway Master Plan Recommended Extension (ft) (1)	Existing Primary Runway Width (ft)	Standard (ft)	Master Plan Recommended Improvements (ft)
Charlottesville-Albemarle	CM	C	III	3/21	6001	6001	6001	0	0	150	100	0
Lynchburg Regional	CM	C	III	4/22	5799	7000	7000	1200	1200	150	100	0
Newport News-Williamsburg International (2)	CM	D	III	7/25	8003	8003	10000	0	2000	150	100	0
Norfolk International	CM	D	V	5/23	9001	9001	9001	0	0	150	150	0
Richmond International (3)	CM	D	IV	16/34	9003	10300	10300	1300	1300	150	150	0
Roanoke Regional	CM	D	IV	6/24	6802	6802	6802	0	0	150	150	0
Ronald Reagan Washington National	CM	D	IV	1/19	6869	6869	6869	0	0	150	150	0
Shenandoah Valley Regional	CM	C	III	5/23	6002	6002	6002	0	0	150	100	0
Washington Dulles International (4)	CM	D	V	1R/19L	11501	11501	11501	0	0	150	150	0

Notes:

- 1) Runway length deficiencies greater than 500 ft.
- 2) To address capacity concerns, Newport News also projects a need to extend Runway 2/20 from 6,525 to 8,000 feet and build a new, parallel 6,000 foot Runway 7L/25R.
- 3) To address capacity concerns, Richmond also projects a need to build a new, 8,000' x 150' parallel 16-34 Runway.
- 4) To address capacity concerns, Washington Dulles International projects a need to build two additional runways during the planning period.

Source: HNTB Analysis of approved airport Master Plans

Taxiway

A full parallel taxiway was considered warranted at airports with at least one of the following:

- › • 40,000 annual operations; or
- › • 20,000 annual operations and landing minimums less than 1 statute-mile visibility and/or less than 400 feet decision height.

As shown in Table 4, the addition of full parallel taxiways should be considered at Accomack County, Newport News-Williamsburg, Shannon, and Suffolk Municipal.

Aircraft Hangar Storage

Demand for hangar space is directly related to the local climate and the type of based aircraft at each airport. Areas with severe weather conditions have a higher demand for hangar storage facilities. In addition, large investments in jet and turboprop aircraft also increase the demand for hangar storage. In Virginia, aircraft storage distribution also varies significantly by service role. Table 5 shows the aircraft storage distribution of each aircraft type by service role, as collected during the survey effort for the Inventory task of this study.

The demand for hangar space shifts when aircraft are moved from one airport to another. Aircraft owners often express interest, and pay a fee to be placed on a waiting list for hangar space at several airports. Consequently, emphasis was placed on overall system demand rather than airport specific demand. Nonetheless, the results of this analysis have been reviewed by the respective airport sponsors, and adjustments have been made where appropriate.

Small general aviation aircraft (less than 12,500 lbs.) can either be stored in a T-hangar or a conventional hangar. The decision of an airport sponsor regarding how to accommodate aircraft storage is generally a function of aircraft mix, physical space in the terminal area, and current construction costs.

Table 3

Primary Runway Length - GA Airports

Airport Name	Service Role	Approach Category	Design Group	Primary Runway	Existing Primary Runway Length (ft)	2005 Required Runway Length (ft)	2005 Runway Length Recommended Improvements (ft) (1, 2)	Existing Primary Runway Width (ft)	Standard (ft)	Runway Width Recommended Improvements (2)
Chesapeake Regional	RL	C	II	5/23	5500	5500		100	100	
Chesterfield County	RL	C	II	15/33	5501	5500		100	100	
Hampton Roads (3)	RL	B	II	10/28	4000	5500	1500	70	75	30
Hanover County Municipal (4)	RL	B	II	16/34	4650	5500	900	100	75	
Leesburg Executive	RL	C	II	17/35	5500	5500		100	100	
Manassas Regional (7)	RL	C	II	16L/34R	5700	6200	500	100	100	
Stafford Regional (New)	RL	C	II	15/33	5000	5500	500	100	100	
Warrenton-Fauquier	RL	B	II	14/32	4103	4103		60	75	15
Accomack County	GR	C	II	3/21	5000	5000		100	100	
Blue Ridge	GR	B	II	12/30	5001	5500	500	100	75	
Culpeper County (5)	GR	B	II	4/22	4002	5500	1500	75	75	25
Danville Regional	GR	C	II	2/20	6500	6500		150	100	
Dinwiddie County Airport	GR	B	II	5/23	5001	5500	500	100	75	
Farmville Regional	GR	B	II	3/21	4400	5500	1100	75	75	25
Ingalls Field	GR	B	II	7/25	5601	5601		100	75	
Lonesome Pine	GR	C	II	6/24	5402	5500		100	100	
Mecklenburg-Brunswick Regional	GR	B	II	1/19	5001	5500	500	75	75	25
Middle Peninsula Regional (8)	GR	B	II	9/27	3700	5300	1600	75	75	
New River Valley	GR	C	II	6/24	6201	6201		150	100	
Shannon	GR	B	I	6/24	2875	3100		100	60	
Suffolk Municipal	GR	C	II	4/22	5007	5007		100	100	
Tazewell County	GR	B	II	7/25	4300	4300		75	75	
Virginia Highlands	GR	B	II	6/24	4470	5500	1000	75	75	25
William M. Tuck	GR	B	II	1/19	4011	4011		75	75	
Winchester Regional	GR	C	II	14/32	5500	5500		100	100	
Blackstone Municipal	GC	C	II	4/22	4632	4632		150	100	
Brookneal-Campbell County	GC	B	II	7/25	3798	3798		60	75	15
Emporia-Greenville Regional	GC	B	II	15/33	5044	5044		100	75	
Franklin Municipal	GC	B	II	9/27	4977	4977		100	75	
Front Royal-Warren County	GC	B	I	9/27	3000	3200		75	60	
Lee County (New)	GC	B	II	6/24		5000	5000		75	75
Louisa County	GC	B	II	9/27	4301	5500	1200	100	75	
Luray Caverns	GC	B	II	4/22	3125	3300		75	75	

Table 3

Primary Runway Length - GA Airports

Airport Name	Service Role	Approach Category	Design Group	Primary Runway	Existing Primary Runway Length (ft)	2005 Required Runway Length (ft)	2005 Runway Length Recommended Improvements (ft) (1, 2)	Existing Primary Runway Width (ft)	Standard (ft)	Runway Width Recommended Improvements (2)
Marks Municipal	GC	B	II	4/22	4500	4500		50	75	25
Mountain Empire	GC	B	II	8/26	5250	5250		75	75	
New Kent County	GC	B	I	10/28	3600	3600		75	60	
Orange County	GC	B	I	7/25	3200	3200		75	60	
Tangier Island	GC	C	II	2/20	2950	3100		75	100	25
Tappahannock-Essex Co. (New)	GC	B	II	8/26		3200	3200		75	75
Twin County	GC	B	I	18/36	4204	4204		60	60	
Virginia Tech	GC	C	II	12/30	4550	5500	1000	100	100	
Wakefield Municipal	GC	B	II	2/20	4337	4337		75	75	
Williamsburg-Jamestown	GC	B	II	13/31	3204	3204		60	75	15
Bridgewater Air Park	LO	B	II	15/33	2745	2000		60	50	
Chase City Municipal	LO	B	I	18/36	3400	2000		50	50	
Crewe Municipal	LO	B	I	15/33	3300	2000		60	50	
Falwell	LO	A	I	10/28	2900	2000		50	50	
Gordonsville Municipal	LO	B	I	5/23	2300	2000		40	50	10
Grundy Municipal	LO	B	I	4/22	2258	2000		60	50	
Hartwood Field (6)	LO	A	I	17/35	2470	2000		50	50	
Hummel Field	LO	B	II	18/36	2145	2000		45	50	5
Lake Anna	LO	A	II	8/26	2560	2000		25	50	25
Lawrenceville-Brunswick	LO	B	I	18/36	3200	2000		50	50	
Lee County	LO	B	II	7/25	2262	2000		50	50	
Lunenburg County	LO	B	I	2/20	3000	2000		50	50	
New London	LO	B	I	16/34	3164	2000		40	50	10
New Market	LO	B	I	6/24	2920	2000		60	50	
Smith Mountain Lake	LO	B	I	5/23	3058	2000		50	50	
Tappahannock Municipal	LO	B	I	2/20	2785	2000		75	50	
Waynesboro	LO	B	I	6/24	2009	2000		50	50	

Notes:

- 1) Runway length deficiencies greater than 500 ft.
- 2) The runway length and width standards for Local Service airports reflect minimum Commonwealth standards.
- 3) Hampton Roads has requested funding for a 1300 foot runway extension for fiscal year 2003.
- 4) Hanover County has requested funding for a 750 foot runway extension for fiscal year 2001.
- 5) Culpeper County has requested funding for a 1000 foot runway extension for fiscal year 2002.
- 6) The Hartwood Field runway is turf.
- 7) The recommended minimum runway length for Manassas has been manually adjusted to reflect special circumstances .

Source: HNTB Analysis; FAA Advisory Circular 5300-13, Change 6, with review and input from DOAV and airport sponsors.

Table 4

Primary Taxiway Requirements

Airport Name	Service Role	ARC (Approach Category)	ARC (Design Group)	Existing Taxiway Type	2000 Operations	2005 Forecast Operations	2020 Forecast Operations	Instrument Approach Minima (1)	Parallel Taxiway Recommended
Charlottesville-Albemarle	CM	C	III	Full Parallel	78,939	90,902	128,468	312-1	Yes
Lynchburg Regional	CM	C	III	Full Parallel	57,707	63,488	86,993	200-1/2	
Newport News-Williamsburg International	CM	D	III	75% Parallel	215,013	226,521	278,056	200-1/2	
Norfolk International	CM	D	V	Full Parallel	124,690	152,213	178,257	200-3/8	
Richmond International	CM	D	IV	Full Parallel	149,898	165,524	214,391	200-1/2	
Roanoke Regional	CM	D	IV	Full Parallel	107,967	113,832	146,473	364-1	
Ronald Reagan Washington National	CM	D	IV	Full Parallel	327,612	343,892	333,342	200-3/8	
Shenandoah Valley Regional	CM	C	III	Full Parallel	20,646	23,023	31,244	200-1/2	
Washington Dulles International (3)	CM	D	V	Full Parallel	456,487	571,535	804,356	200-1/2	
Chesapeake Regional	RL	C	II	Full Parallel	27,176	30,171	39,963	360-3/4	
Chesterfield County	RL	C	II	Full Parallel	45,014	54,796	66,689	200-1/2	
Hampton Roads	RL	B	II	Full Parallel	55,287	59,299	72,399	380-1	
Hanover County Municipal	RL	B	II	Full Parallel	26,379	29,774	41,116	355-1	
Leesburg Executive	RL	C	II	Full Parallel	82,724	94,325	133,359	428-1	
Manassas Regional	RL	C	II	Full Parallel	136,046	137,604	168,298	250-3/4	
Stafford Regional (New)	RL	C	II	Full Parallel		17,775	30,798	n/a	
Warrenton-Fauquier	RL	B	II	Full Parallel	37,421	40,759	51,488	637-1	
Accomack County	GR	C	II	Stub	9,429	11,903	20,194	373-1	Yes
Blue Ridge	GR	B	II	Full Parallel	21,810	22,709	25,392	515-1	
Culpeper County	GR	B	II	Full Parallel	42,160	51,626	83,479	507-1	
Danville Regional	GR	C	II	Full Parallel	15,836	17,506	23,083	341-1/2	
Dinwiddie County Airport (2)	GR	B	II	Full Parallel	31,846	37,191	54,694	427-1	
Farmville Regional	GR	B	II	Stub	9,568	10,642	14,232	403-1	
Ingalls Field	GR	B	II	Full Parallel	2,579	3,925	8,827	315-1	
Lonesome Pine	GR	C	II	Partial Parallel	8,409	8,977	10,636	609-1	
Mecklenburg-Brunswick Regional	GR	B	II	Stub	5,526	7,251	13,076	318-1	
Middle Peninsula Regional	GR	B	II	Full Parallel	11,395	14,523	25,077	496-1	Yes
New River Valley	GR	C	II	Partial Parallel	8,826	9,105	9,995	209-1	
Shannon	GR	B	I	None	52,329	53,294	62,367	495-1	
Suffolk Municipal	GR	C	II	Partial Parallel	30,277	35,233	51,720	353-1	
Tazewell County	GR	B	II	Stub	4,740	4,953	5,515	528-1	
Virginia Highlands	GR	B	II	Full Parallel	22,527	23,500	26,061	732-1	
William M. Tuck	GR	B	II	Full Parallel	6,999	7,220	7,925	530-1	
Winchester Regional	GR	C	II	Full Parallel	29,794	34,507	50,429	259-1	

Table 4

Primary Taxiway Requirements

Airport Name	Service Role	ARC (Approach Category)	ARC (Design Group)	Existing Taxiway Type	2000 Operations	2005 Forecast Operations	2020 Forecast Operations	Instrument Approach Minima (1)	Parallel Taxiway Recommended
Blackstone Municipal	GC	C	II	Stub	3,037	3,402	4,531	427-1	
Brookneal-Campbell County	GC	B	II	Stub	737	760	834	583-1	
Emporia-Greenville Regional	GC	B	II	Stub	1,100	1,135	1,246	299-1	
Franklin Municipal	GC	B	II	Partial Parallel	4,405	4,829	6,237	443-3/4	
Front Royal-Warren County	GC	B	I	Stub	9,519	11,654	18,710	n/a	
Lee County (New)	GC	B	II	Stub			8,091	n/a	
Louisa County	GC	B	II	Full Parallel	13,257	17,889	33,892	387-1	
Luray Caverns	GC	B	II	Stub	3,315	3,420	3,754	1358-1 1/4	
Marks Municipal	GC	B	II	Stub	1,474	1,520	1,668	417-1	
Mountain Empire	GC	B	II	Full Parallel	9,797	10,136	11,159	524-1	
New Kent County	GC	B	I	Full Parallel	14,457	14,971	16,489	577-1	
Orange County	GC	B	I	Stub	8,099	8,355	9,171	674-1	
Tangier Island	GC	C	II	Stub	1,000	1,000	1,000	713-1	
Tappahannock-Essex Co. (New)	GC	B	II	Stub			14,359	n/a	
Twin County	GC	B	I	Stub	6,074	7,485	12,084	367-1	
Virginia Tech	GC	C	II	Full Parallel	13,805	15,464	20,779	341-1	
Wakefield Municipal	GC	B	II	Stub	10,539	13,627	23,993	727-1	
Williamsburg-Jamestown	GC	B	II	Full Parallel	20,833	24,120	35,074	631-1	
Bridgewater Air Park	LO	B	II	Stub	11,100	11,534	12,877	1135-1 1/4	
Chase City Municipal	LO	B	I	Stub	1,842	2,185	3,337	694-1	
Crewe Municipal	LO	B	I	Partial Parallel	3,679	3,985	4,999	n/a	
Falwell	LO	A	I	Partial Parallel	6,263	7,188	10,273	n/a	
Gordonsville Municipal	LO	B	I	Stub	5,521	7,308	13,337	1038-1 1/4	
Grundy Municipal	LO	B	I	Stub	3,674	3,979	4,993	416-1	
Hartwood Field	LO	A	I	Turf	3,998	4,653	6,733	n/a	
Hummel Field	LO	B	II	Stub	13,486	15,881	23,861	490-1	
Lake Anna	LO	A	II	Stub	368	380	417	n/a	
Lawrenceville-Brunswick	LO	B	I	Stub	1,842	2,280	3,754	n/a	
Lee County	LO	B	II	Stub	1,842	2,470	-	n/a	
Lunenburg County	LO	B	I	Stub	368	380	417	n/a	
New London	LO	B	I	Full Parallel	21,819	26,458	41,955	n/a	
New Market	LO	B	I	Partial Parallel	12,834	14,232	18,724	n/a	
Smith Mountain Lake	LO	B	I	Partial Parallel	4,769	4,920	5,402	674-1	
Tappahannock Municipal	LO	B	I	Stub	5,157	6,270	-	n/a	
Waynesboro	LO	B	I	Full Parallel	11,630	12,176	13,542	n/a	

- 1) Instrument approach minima includes decision height or minimum descent altitude (as appropriate) and visibility minimums. Criteria do not reflect approaches that require special aircrew and aircraft certification.
- 2) Construction will begin on a new parallel taxiway in the fall of 2001.
- 3) IAD plans a new Taxiway F and Taxiway J extension by 2007.

Source: HNTB Analysis

Table 5

Aircraft Storage Distribution

Commercial Service			
		Conventional	
	T-Hangar	Hangar	Tie-down
Single-engine	56%	14%	30%
Multi-Engine	32%	66%	2%
Turboprop	6%	85%	9%
Jet	0%	100%	0%
Reliever			
		Conventional	
	T-Hangar	Hangar	Tie-down
Single-engine	78%	2%	20%
Multi-Engine	67%	27%	6%
Turboprop	0%	89%	11%
Jet	0%	100%	0%
General Aviation - Regional			
		Conventional	
	T-Hangar	Hangar	Tie-down
Single-engine	77%	11%	12%
Multi-Engine	45%	39%	16%
Turboprop	0%	100%	0%
Jet	0%	100%	0%
General Aviation - Community			
		Conventional	
	T-Hangar	Hangar	Tie-down
Single-engine	50%	19%	31%
Multi-Engine	42%	50%	8%
Turboprop	0%	83%	17%
Jet	0%	100%	0%
General Aviation - Local Service			
		Conventional	
	T-Hangar	Hangar	Tie-down
Single-engine	26%	44%	29%
Multi-Engine	25%	25%	50%
Turboprop	0%	47%	53%
Jet	0%	0%	0%

Source: HNTB Analysis

T-Hangar Requirements

T-hangars are individual aircraft storage hangars, similar to individual car garages; however, they are arranged adjacent to each other, alternating nose, tail, nose, etc., resulting in a “T” shaped storage space.

T-hangar requirements were derived from inventory survey results of existing facilities, using the forecast based aircraft and multiplying by the appropriate distribution assumptions given in Table 5. Assuming that nominal deficiencies would not be remedied, Table 6 summarizes T-hangar requirements greater than or equal to eight units. Minimum requirements shown are the greater of the calculated required facilities, or the existing facilities.

T-hangar requirements are a function of the mix of based aircraft. Consequently, the number of recommended T-hangars may vary over time as the mix of based aircraft changes. Though the total number of based aircraft may remain constant; the overall mix of aircraft types can change to reflect a different proportion of aircraft in a particular category (i.e. single-engine, multi-engine, turboprop, or jet). Also, as new airports open and others close in Virginia, the distribution of based aircraft shifts from one site to another. This redistribution will affect the need for T-hangars at each airport.

It is also important to note that due to the nature of the airports, Washington Dulles International Airport and Ronald Reagan Washington National Airport, do not use T-hangar storage facilities. Therefore, the T-hangar requirement for these airports was manually adjusted.

Conventional Hangar Requirement

Conventional hangars are usually rectangular with one large door and space for one or more aircraft. Conventional hangar requirements were derived from inventory survey results of existing facilities, forecast based aircraft and the distribution assumptions given in Table 5. For planning purposes, the following aircraft space requirements were used to determine total conventional hangar needs:

- › • Single Engine Piston – 850 square feet
- › • Multi Engine Piston – 1,200 square feet
- › • Multi Engine Turboprop – 1,700 square feet
- › • Multi Engine Jet – 2,900 square feet

Assuming that nominal deficiencies would not be remedied, Table 7 summarizes conventional hangar requirements greater than or equal to 3,000 square feet. Minimum requirements shown are the greater of the calculated required facilities, or the existing facilities.

Table 6

Unconstrained T-Hangar Requirements Forecast

Airport Name	Service Role	Approach Category	Design Group	Existing T-Hangars	2000	2005	2020	2000	2005	2020
					T-Hangars Needed	T-Hangars Needed	T-Hangars Needed	Recommended Additional T-Hangars (1)	Recommended Additional T-Hangars (1)	Recommended Additional T-Hangars (1)
Charlottesville-Albemarle	CM	C	III	36	49	52	60	13	16	24
Lynchburg Regional	CM	C	III	0	23	25	37	23	25	37
Newport News-Williamsburg International	CM	D	III	32	51	50	50	19	18	18
Norfolk International	CM	D	V	42	42	42	42			
Richmond International	CM	D	IV	0	32	30	28	32	30	28
Roanoke Regional	CM	D	IV	34	56	59	69	22	25	35
Ronald Reagan Washington National (2)	CM	D	IV	0						
Shenandoah Valley Regional	CM	C	III	57	60	69	79		12	22
Washington Dulles International (2)	CM	D	V	0						
Chesapeake Regional	RL	C	II	68	67	74	84			16
Chesterfield County	RL	C	II	90	90	100	120		10	30
Hampton Roads	RL	B	II	90	110	113	124	20	23	34
Hanover County Municipal	RL	B	II	48	51	55	67			19
Leesburg Executive	RL	C	II	88	151	164	201	63	76	113
Manassas Regional	RL	C	II	190	213	203	215	23	13	25
Stafford Regional (New)	RL	C	II	0		24	45		24	45
Warrenton-Fauquier	RL	B	II	79	79	79	83			
Accomack County	GR	C	II	18	18	22	33			15
Blue Ridge	GR	B	II	49	49	49	49			
Culpeper County	GR	B	II	105	105	116	167		11	62
Danville Regional	GR	C	II	30	30	40	50		10	20
Dinwiddie County Airport	GR	B	II	42	52	56	73	10	14	31
Farmville Regional	GR	B	II	0	16	16	19	16	16	19
Ingalls Field	GR	B	II	5	5	5	8			
Lonesome Pine	GR	C	II	6	11	11	11			
Mecklenburg-Brunswick Regional	GR	B	II	12	12	12	17			
Middle Peninsula Regional	GR	B	II	5	20	25	40	15	20	35
New River Valley	GR	C	II	10	18	16	15			
Shannon	GR	B	I	119	130	130	136	11	11	17
Suffolk Municipal	GR	C	II	62	69	77	98		15	36
Tazewell County	GR	B	II	8	8	8	9			
Virginia Highlands	GR	B	II	40	50	60	60	10	20	20
William M. Tuck	GR	B	II	16	16	16	16			
Winchester Regional	GR	C	II	52	56	62	81		10	29

Table 6

Unconstrained T-Hangar Requirements Forecast

Airport Name	Service Role	Approach Category	Design Group	Existing T-Hangars	2000	2005	2020	2000	2005	2020
					T-Hangars Needed	T-Hangars Needed	T-Hangars Needed	Recommended Additional T-Hangars (1)	Recommended Additional T-Hangars (1)	Recommended Additional T-Hangars (1)
Blackstone Municipal	GC	C	II	10	10	10	10			
Brookneal-Campbell County	GC	B	II	0	1	1	1			
Emporia-Greenville Regional	GC	B	II	6	6	6	6			
Franklin Municipal	GC	B	II	22	22	22	22			
Front Royal-Warren County	GC	B	I	10	10	12	17			
Lee County (New)	GC	B	II	0			8			
Louisa County	GC	B	II	20	16	20	33			13
Luray Caverns	GC	B	II	0	5	5	5			
Marks Municipal	GC	B	II	0	2	2	2			
Mountain Empire	GC	B	II	0	12	12	12	12	12	12
New Kent County	GC	B	I	29	29	29	29			
Orange County	GC	B	I	10	11	11	11			
Tangier Island	GC	C	II	0						
Tappahannock-Essex Co. (New)	GC	B	II	0	8	8	17	8		17
Twin County	GC	B	I	6	12	12	12			
Virginia Tech	GC	C	II	9	16	19	29		10	20
Wakefield Municipal	GC	B	II	7	13	17	27		10	20
Williamsburg-Jamestown	GC	B	II	19	27	30	40	8	11	21

1) Assuming nominal deficiencies would not be remedied, this table reflects T-hangar deficiencies of eight or greater.

2) Ronald Reagan Washington National and Dulles International airports were manually adjusted. These airports do not use or require T-hangars.

Source: HNTB Analysis

Table 7

Unconstrained Conventional Hangar Requirements Forecast

Airport Name	Service Role	Existing Conventional Hangar Space (sf)	2000	2005	2020	2000	2005	2020
			Conventional Hangar Space Needed (sf)	Conventional Hangar Space Needed (sf)	Conventional Hangar Space Needed (sf)	Additional Space Recommended (1)	Additional Space Recommended (1)	Additional Space Recommended (1)
Charlottesville-Albemarle	CM	63,500	79,900	87,800	128,800	16,400	24,300	65,300
Lynchburg Regional	CM	52,500	63,400	68,900	85,900	10,900	16,400	33,400
Newport News-Williamsburg International	CM	43,400	67,600	86,600	128,800	24,200	43,200	85,400
Norfolk International	CM	79,060	86,100	99,700	119,800	7,040	20,640	40,740
Richmond International	CM	135,030	150,300	161,800	220,200	15,270	26,770	85,170
Roanoke Regional	CM	102,100	102,100	96,200	101,200			
Ronald Reagan Washington National	CM	490,422	490,422	490,422	490,422			
Shenandoah Valley Regional	CM	26,000	32,900	35,700	43,000	6,900	9,700	17,000
Washington Dulles International	CM	0	0	0	1,306,800			1,306,800
Chesapeake Regional	RL	23,000	27,400	33,200	35,300	4,400	10,200	12,300
Chesterfield County	RL	60,660	62,125	77,425	94,725		16,765	34,065
Hampton Roads	RL	41,040	41,040	41,040	41,040			
Hanover County Municipal	RL		6,700	8,100	13,500	6,700	8,100	13,500
Leesburg Executive	RL	32,240	38,200	44,400	78,700	5,960	12,160	46,460
Manassas Regional	RL	138,000	138,000	147,700	182,600		9,700	44,600
Stafford Regional (New)	RL	0		14,300	26,800		14,300	26,800
Warrenton-Fauquier	RL	2,100	5,000	5,100	5,500			3,400
Accomack County	GR		3,400	3,600	5,400	3,400	3,600	5,400
Blue Ridge	GR	17,300	21,900	17,100	19,400	4,600		
Culpeper County	GR	28,125	28,125	28,125	39,300			11,175
Danville Regional	GR	37,869	37,869	37,869	43,369			5,500
Dinwiddie County Airport	GR	34,351	41,428	44,128	58,828	7,077	9,777	24,477
Farmville Regional	GR	6,240	8,100	9,700	14,300		3,460	8,060
Ingalls Field	GR	13,400	13,400	13,400	16,600			3,200
Lonesome Pine	GR	17,700	17,700	17,700	17,700			
Mecklenburg-Brunswick Regional	GR	6,400	6,400	8,400	18,000			11,600
Middle Peninsula Regional	GR	4,800	6,600	8,200	12,900		3,400	8,100
New River Valley	GR	8,000	8,000	8,200	10,400			
Shannon	GR	16,600	19,100	19,000	19,900			3,300
Suffolk Municipal	GR	32,400	32,400	36,200	49,400		3,800	17,000
Tazewell County	GR	2,805	4,000	4,100	4,200			
Virginia Highlands	GR	49,300	80,300	100,300	100,300	31,000	51,000	51,000
William M. Tuck	GR		1,800	1,800	1,800			
Winchester Regional	GR	72,000	72,000	72,000	72,000			

Table 7

Unconstrained Conventional Hangar Requirements Forecast

Airport Name	Service Role	Existing Conventional Hangar Space (sf)	2000	2005	2020	2000	2005	2020
			Conventional Hangar Space Needed (sf)	Conventional Hangar Space Needed (sf)	Conventional Hangar Space Needed (sf)	Additional Space Recommended (1)	Additional Space Recommended (1)	Additional Space Recommended (1)
Blackstone Municipal	GC		800	800	1,000			
Brookneal-Campbell County	GC	27,000	27,000	27,000	27,000			
Emporia-Greenville Regional	GC	2,600	2,600	2,600	2,600			
Franklin Municipal	GC	25,300	25,300	25,300	25,300			
Front Royal-Warren County	GC	4,000	4,800	5,600	7,900			3,900
Lee County (New)	GC				6,400			6,400
Louisa County	GC	11,200	12,500	17,300	34,000		6,100	22,800
Luray Caverns	GC		1,500	1,500	1,500			
Marks Municipal	GC	7,200	7,200	7,200	7,200			
Mountain Empire	GC	18,000	18,000	18,000	18,000			
New Kent County	GC	9,300	9,300	9,300	9,300			
Orange County	GC	100	4,000	4,000	3,900	3,900	3,900	3,800
Tangier Island	GC							
Tappahannock-Essex Co. (New)	GC				9,200			9,200
Twin County	GC	8,000	8,000	8,000	8,000			
Virginia Tech	GC	7,800	10,300	12,800	18,200		5,000	10,400
Wakefield Municipal	GC	4,000	5,400	6,000	9,400			5,400
Williamsburg-Jamestown	GC	22,000	22,000	22,000	26,400			4,400

1) Assuming nominal deficiencies would not be remedied, this table reflects conventional hangar deficiencies of 3,000 square feet or greater.

Source: HNTB Analysis

Apron Area

Apron areas were calculated for paved tie-down areas for based and transient aircraft. Assuming that nominal deficiencies would not be remedied, Table 8 summarizes apron requirements greater than or equal to 7,500 square yards. Minimum requirements shown are the greater of the calculated required facilities, or the existing facilities.

Transient Aircraft Apron

Apron area requirements for transient aircraft parking were derived by multiplying the forecast busy day itinerant operations by the appropriate aircraft space requirements. The following assumptions were used:

- › Total operations by aircraft type were taken from the GA Forecasts presented as part of this document. Daily operations were derived by dividing the number of annual operations by 365. It was assumed that a busy day was 10 percent more active than an average day.
- › The number of transient operations was assumed to be a factor of runway length. Per 1998 Civil Air Patrol survey data¹², airports with primary runways greater than 4,000 feet were assumed to have 29 percent transient operations; airports with primary runways less than 4,000 feet were assumed to have 31 percent transient operations.
- › The majority of transient aircraft will arrive and depart on the same day; thus, it is assumed that the actual number of aircraft utilizing the parking apron is one-half (50 percent) of the transient operations on the average day of the peak month.
- › 50 percent of transient aircraft will be on the apron at any given time.
- › Aircraft space requirements reflect square yardage that includes circulation area for ingress and egress of aircraft. Required areas were calculated for each category of aircraft (SEP, MEP, MET, MEJ). Circulation area was then added based on Design Group II taxiway centerline to fixed or moveable object separation standards. In addition, a separation of 10 feet between SEP and MEP aircraft, and 20 feet between MET/MEJ aircraft was assumed. The apron space assumed for each aircraft type is as follows:
 - Single Engine Piston – 870 square yards
 - Multi Engine Piston – 960 square yards
 - Multi Engine Turboprop – 1,730 square yards
 - Multi Engine Jet – 2,540 square yards

¹² *The 1998 Virginia Department of Aviation On-Site Air Activity Survey*, Virginia Department of Aviation, 1998.

Based Aircraft Apron

Apron area requirements for based aircraft parking were derived by multiplying forecast based aircraft by the appropriate parking distribution assumptions in Table 4, and the appropriate aircraft space requirements. Apron space requirements for each type of aircraft were assumed to be the same as those calculated for transient aircraft.

Table 8

Unconstrained Apron Area Requirements Forecast

Airport Name	Service Role	Existing Apron Area (sy)	2000 Total Apron Area Needed (sy)	2005 Total Apron Area Needed (sy)	2020 Total Apron Area Needed (sy)	2000 Additional Apron Recommended (1)	2005 Additional Apron Recommended (1)
Charlottesville-Albemarle (AC Apron)	CM	33,225	33,225	33,225	43,225		
Charlottesville-Albemarle (GA Apron)	CM	27,750	30,100	33,500	44,900		
Lynchburg Regional (AC Apron)	CM	16,000	16,000	16,000	16,000		
Lynchburg Regional (GA Apron)	CM	16,700	20,000	22,600	31,000		
Newport News-Williamsburg International (AC Apron)	CM	59,000	112,000	112,000	138,100	53,000	53,000
Newport News-Williamsburg International (GA Apron)	CM	86,000	86,000	87,100	107,200		
Norfolk International (AC Apron)	CM						
Norfolk International (GA Apron)	CM	95,400	95,400	95,400	95,400		
Richmond International (AC Apron)	CM	185,000	185,000	185,000	185,000		
Richmond International (GA Apron)	CM	58,175	58,175	58,175	58,175		
Roanoke Regional (AC Apron)	CM	62,500	62,500	62,500	62,500		
Roanoke Regional (GA Apron)	CM	27,500	39,500	42,700	53,300	12,000	15,200
Ronald Reagan Washington National (AC Apron)	CM	902,065	902,065	902,065	902,065		
Ronald Reagan Washington National (GA Apron)	CM	397,414	397,414	397,414	436,414		
Shenandoah Valley Regional (AC Apron)	CM	9,700	9,700	16,000	16,000		
Shenandoah Valley Regional (GA Apron)	CM	34,000	34,000	34,000	34,000		
Washington Dulles International (AC Apron)	CM	4,151,993	4,151,993	4,312,193	7,453,593		160,200
Washington Dulles International (GA Apron)	CM	918,875	918,875	918,875	918,875		
Chesapeake Regional	RL	28,650	28,650	28,650	28,650		
Chesterfield County	RL	46,000	46,000	46,000	46,000		
Hampton Roads	RL	5,733	35,900	37,200	42,700	30,200	31,500
Hanover County Municipal	RL	3,389	17,200	18,600	24,000	13,800	15,200
Leesburg Executive	RL	72,500	83,500	88,000	106,700	11,000	15,500
Manassas Regional	RL	15,933	76,700	75,200	86,400	60,800	59,300
Stafford Regional (New)	RL	115,180	-	115,180	115,180		
Warrenton-Fauquier	RL	6,000	21,800	23,000	27,200	15,800	17,000
Accomack County	GR	10,360	10,360	10,360	11,500		
Blue Ridge	GR	3,300	10,000	10,200	10,800		
Culpeper County	GR	20,000	29,300	33,100	45,200	9,300	13,100
Danville Regional	GR	36,965	36,965	59,965	59,965		23,000
Dinwiddie County Airport	GR	24,000	24,000	24,000	24,000		
Farmville Regional	GR	14,000	14,000	14,000	14,000		
Ingalls Field	GR	25,000	25,000	25,000	25,000		
Lonesome Pine	GR	6,005	6,005	6,005	6,005		

Table 8

Unconstrained Apron Area Requirements Forecast

Airport Name	Service Role	Existing Apron Area (sy)	2000	2005	2020	2000	2005
			Total Apron Area Needed (sy)	Total Apron Area Needed (sy)	Total Apron Area Needed (sy)	Additional Apron Recommended (1)	Additional Apron Recommended (1)
Mecklenburg-Brunswick Regional	GR	1,000	2,600	3,600	6,400		
Middle Peninsula Regional	GR	1,527	5,800	7,300	11,800		
New River Valley	GR	13,889	13,889	13,889	13,889		
Shannon	GR	12,400	25,400	25,300	27,900	13,000	12,900
Suffolk Municipal	GR	22,322	22,322	22,322	22,322		
Tazewell County	GR	11,000	11,000	11,000	11,000		
Virginia Highlands	GR	24,000	34,000	41,000	41,000	10,000	17,000
William M. Tuck	GR	3,333	6,300	6,400	6,500		
Winchester Regional	GR	23,750	23,750	23,750	23,750		
Blackstone Municipal	GC	3,365	3,365	3,365	3,365		
Brookneal-Campbell County	GC	8,944	8,944	8,944	8,944		
Emporia-Greenville Regional	GC	42,300	42,300	42,300	42,300		
Franklin Municipal	GC	7,500	7,500	7,500	7,500		
Front Royal-Warren County	GC	3,590	6,900	8,100	11,900		
Lee County (New)	GC	-	-	-	7,800		
Louisa County	GC	17,500	17,500	17,500	17,500		
Luray Caverns	GC	1,250	4,600	4,600	4,700		
Marks Municipal	GC	2,000	2,000	2,000	2,100		
Mountain Empire	GC	642	8,200	8,200	8,400	7,600	7,600
New Kent County	GC	8,000	12,400	12,400	12,600		
Orange County	GC	4,700	7,300	7,400	7,600		
Tangier Island	GC	22,881	22,881	22,881	22,881		
Tappahannock-Essex Co. (New)	GC	-	-	-	13,400		
Twin County	GC	4,444	4,444	8,444	9,900		
Virginia Tech	GC	16,970	16,970	16,970	16,970		
Wakefield Municipal	GC	1,058	9,000	11,300	18,500	7,900	10,200
Williamsburg-Jamestown	GC	16,400	22,900	25,100	32,300		8,700

1) Assuming nominal deficiencies would not be remedied, this table reflects apron deficiencies of 7,500 square yards or greater.

Source: HNTB Analysis

Auto Parking

Auto parking requirements were estimated by assuming a need for 1 parking space per airport or tenant employee and 1.5 auto parking spaces per based aircraft departure on an average day in the peak month. The results were then reviewed and revised with the assistance of each airport sponsor. The methodology used was a macro-level analysis and should not replace more detailed Master Planning done for individual airports. Assuming that nominal deficiencies would not be remedied, Table 9 summarizes auto parking requirements greater than or equal to 20 spaces. Minimum requirements shown are the greater of the calculated required facilities, or the existing facilities.

GA Terminal Buildings

The terminal building requirements for general aviation airports were derived from the Virginia Department of Aviation terminal program. However, this program calculates only the State funding eligible portion of the terminal, which is approximately 70 percent of an average terminal building. Therefore, Table 10 has been adjusted to represent the total terminal space needed, or 1.3 times the requirement determined by the Department of Aviation terminal program. Minimum requirements shown are the greater of the calculated required facilities, or the existing facilities.

NAVAIDS

Table 11 outlines the recommended Navaid guidelines for each category of airport in the Commonwealth. Recommended navigation and landing aids include instrument approach capability, runway lighting, communication, vertical guidance visual aids, runway end identifier lights, and weather reporting. Tables 12-16 summarize the requirements for each type of navigation or landing aid. Minimum requirements shown are the greater of the calculated required facilities, or the existing facilities.

Instrument Approach Capability

The recommended guideline for the primary runway at Commercial Service and Reliever airports is precision approach capability. When possible, the primary runway at GA Regional airports should have non-precision approach capability with a recommended minima of (300-1), and the primary runway at GA Community airports should have non-precision approach capability with a recommended minima of (400-1). These are recommended guidelines only, and it is recognized that these minimum are not always attainable. Actual airport-specific recommendations and project justification will vary with factors including airport demand, high corporate use, and cost-benefit of the improvement.

As shown in Table 12, there are no instrument approach capability improvements recommended for Commercial Service airports, however six of the current eight Reliever airports have only a non-precision approach, and one GA Community airport has only a visual approach. In addition, although each of the GA Regional and most of the GA Community airports have a non-precision approach, many of these airports do not meet the recommended approach minima. Consequently, recognizing that approach minima

are determined by a variety of factors, and are not always attainable, only the approach type was considered when determining recommended improvements.

Runway Lighting

High Intensity Runway Lights (HIRL) are recommended for the primary runway at Commercial Service and Reliever airports. Medium Intensity Runway Lights (MIRL) are recommended for the primary runway at GA Regional and GA Community airports.

As shown in Table 13, there are no improvements recommended for Commercial Service airports, however improvements are recommended for five Reliever airports, one GA Regional airport, and four GA Community airports.

GCO/RTR/RCO

A Remote Communication Outlet (RCO) is recommended for Commercial Service airports. A Ground Communication Outlet (GCO) or Remote Transmitter/Receiver (RTR) is recommended for Reliever, and GA Regional airports.

An RCO is an unstaffed, remotely controlled air to ground communications facility providing communications capability to extend the service range of FSS facilities.

A GCO is a lower cost alternative to an RCO, which allows pilots at uncontrolled airports to contact ATC or FSS via VHF to a telephone connection to obtain an instrument clearance or close a flight plan. They may also get an updated weather briefing prior to takeoff. A GCO is an unstaffed, remotely controlled ground to ground communications facility that is a combination of a radio transceiver and an automated telephone dialer. GCO's must only be utilized by aircraft on the ground, as they serve an extremely limited area, and airborne aircraft may activate multiple GCO's simultaneously.

An RTR provides radio communication services between air traffic controllers at terminal facilities and aircraft pilots. It is an unstaffed, remotely controlled air to ground communications facility, remotely controlled and providing communications capability to extend the service range of ATC facilities.

As shown in Table 14, improvements are recommended for only two Commonwealth airports.

Vertical Guidance Visual Aid

A Vertical Guidance Visual Aid (VGVA) is recommended for both ends of primary runways. A Precision Approach Path Indicator (PAPI) is recommended for all but Local Service airports, which may be served by a single unit State-approved system. Table 15 summarizes the VGVA recommended improvements.

Runway End Identification Lights (REIL)

Runway End Identification Lights (REIL) are recommended for all straight-in approaches, where no approach lighting system exists. Table 16 summarizes the REIL recommended improvements.

Weather Reporting

For Commercial Service, Reliever, and GA Regional airports, the recommended guidelines regarding short-term and long-term weather reporting are shown below.

2005	2020
ASOS or AWOS III-P-T	ASOS or AWOS IV

An Automated Surface Observing System (ASOS) is an automated observing system that provides weather observations including temperature, dew point, wind, altimeter setting, visibility, sky condition, and precipitation.

An Automated Weather Observing System (AWOS) is a suite of sensors, which measure, collect and

AWOS III: Wind Speed, Wind Gust, Wind Direction, Variable Wind Direction, Temperature, Dew Point, Altimeter Setting, Density Altitude, Visibility, Variable Visibility, Sky Condition, Cloud Height and Type.

AWOS III-P-T: Same as AWOS III, plus Present Weather and Lightning Detection

AWOS IV: Same as AWOS III-P-T, plus Runway Surface Sensors.

The basic difference between these two automated weather systems is that the ASOS is a product of a National Weather Service (NWS), Department of Defense (DoD) and Federal Aviation Administration (FAA) joint venture, and is comprised of a generally standard suite of weather sensors. AWOS is a suite of weather sensors of many different configurations that were either procured by the FAA or purchased by individuals, groups, airports, etc. that are required to meet FAA standards to be able to report weather parameters.

Table 17 summarizes weather reporting recommended improvements.

Table 9

Unconstrained GA Auto Parking Requirements Forecast

Airport Name	Service Role	Existing Auto Parking Spaces	2000	2005	2020	2,000	2005	2020
			Required Parking Spaces	Required Parking Spaces	Required Parking Spaces	Additional Parking Space Recommended (1)	Additional Parking Space Recommended (1)	Additional Parking Space Recommended (1)
Charlottesville-Albemarle (AC Auto Parking)	CM	893	893	1,163	1,473		270	580
Charlottesville-Albemarle (GA Auto Parking)	CM	100	130	144	194	30	44	94
Lynchburg Regional (AC Auto Parking)	CM	539	539	599	813		60	274
Lynchburg Regional (GA Auto Parking)	CM	105	107	119	158			53
Newport News-Williamsburg International (AC Auto Parking)	CM	1,181	1,533	1,533	1,971	352	352	790
Newport News-Williamsburg International (GA Auto Parking)	CM	766	766	860	1,093		94	327
Norfolk International (AC Auto Parking)	CM	5237	5237	8,337	11,337		3,100	6100
Norfolk International (GA Auto Parking)	CM	171	171	171	200			29
Richmond International (AC Auto Parking)	CM	6,019	6,019	7,919	9,919		1,900	3900
Richmond International (GA Auto Parking)	CM	340	340	340	430			90
Roanoke Regional (AC Auto Parking)	CM	1,440	1,440	1,600	1,975		160	535
Roanoke Regional (GA Auto Parking)	CM	150	200	212	255	50	62	105
Ronald Reagan Washington National (AC Auto Parking)	CM	2700	2700	2,700	2,700			
Ronald Reagan Washington National (GA Auto Parking)	CM	35	35	35	35			
Shenandoah Valley Regional (AC Auto Parking)	CM	340	550	550	550	210	210	210
Shenandoah Valley Regional (GA Auto Parking)	CM	350	350	350	350			
Washington Dulles International (AC Auto Parking)	CM	6038	6038	9,538	10,538		3,500	4500
Washington Dulles International (GA Auto Parking)	CM	225	225	225	225			
Chesapeake Regional	RL	51	70	85	105		34	54
Chesterfield County	RL	267	267	331	398		64	131
Hampton Roads	RL	55	104	111	135	49	56	80
Hanover County Municipal	RL	75	75	75	81			
Leesburg Executive	RL	186	207	229	301	21	43	115
Manassas Regional	RL	110	256	259	315	146	149	205
Stafford Regional (New)	RL	61		61	61			
Warrenton-Fauquier	RL	30	74	80	100	44	50	70
Accomack County	GR	30	36	51	66		21	36
Blue Ridge	GR	25	45	47	52	20	22	27
Culpeper County	GR	30	83	100	159	53	70	129
Danville Regional	GR	140	140	155	204			64
Dinwiddie County Airport (2)	GR	0	96	96	106	96	96	106
Farmville Regional	GR	25	25	25	31			
Ingalls Field	GR	73	73	73	73			
Lonesome Pine	GR	60	60	60	60			

Table 9

Unconstrained GA Auto Parking Requirements Forecast

Airport Name	Service Role	Existing Auto Parking Spaces	2000	2005	2020	2,000	2005	2020
			Required Parking Spaces	Required Parking Spaces	Required Parking Spaces	Additional Parking Space Recommended (1)	Additional Parking Space Recommended (1)	Additional Parking Space Recommended (1)
Mecklenburg-Brunswick Regional	GR	30	30	30	30			
Middle Peninsula Regional (2)	GR	0	30	30	50	30	30	50
New River Valley	GR	50	50	50	50			
Shannon	GR	60	99	100	117	39	40	57
Suffolk Municipal	GR	50	61	70	100			50
Tazewell County	GR	10	14	14	15			
Virginia Highlands	GR	41	47	48	53			
William M. Tuck	GR	75	75	75	75			
Winchester Regional	GR	90	90	90	90			
Blackstone Municipal	GC	6	8	8	10			
Brookneal-Campbell County	GC	0	3	3	3			
Emporia-Greenville Regional	GC	30	30	30	30			
Franklin Municipal	GC	48	48	48	48			
Front Royal-Warren County	GC	15	19	23	36			21
Lee County (New)	GC	0	30	30	30	30	30	30
Louisa County	GC	10	26	35	64		25	54
Luray Caverns	GC	15	28	28	29			
Marks Municipal	GC	10	10	10	10			
Mountain Empire	GC	10	20	21	23			
New Kent County	GC	35	35	35	35			
Orange County	GC	20	20	20	20			
Tangier Island	GC	1	1	1	1			
Tappahannock-Essex Co. (New)	GC	0	14	14	28			28
Twin County	GC	25	25	25	25			
Virginia Tech	GC	62	62	62	62			
Wakefield Municipal	GC	12	21	26	45			33
Williamsburg-Jamestown	GC	76	76	88	128			52

1) Assuming nominal deficiencies would not be remedied, this table reflects auto parking deficiencies of 20 or more spaces.

2) Existing parking is not paved. Requirements reflect a need for additional paved parking.

Source: HNTB Analysis

Table 10

Unconstrained Terminal Requirements Forecast

Airport Name	Service Role	Existing GA Terminal (sf)	2000	2005	2020	2000	2005	2020
			GA Terminal Required Area (sf)	GA Terminal Required Area (sf)	GA Terminal Required Area (sf)	Additional Terminal Area Recommended (1)	Additional Terminal Area Recommended (1)	Additional Terminal Area Recommended (1)
Charlottesville-Albemarle (AC Term)	CM	60,000	60,000	60,000	60,000		-	-
Charlottesville-Albemarle (GA Term)	CM	3,800	7,300	7,500	8,100	3,500	3,700	4,300
Lynchburg Regional (AC Term)	CM	38,000	38,000	38,000	38,000			
Lynchburg Regional (GA Term)	CM	4,500	6,700	7,200	7,700	2,200	2,700	3,200
Newport News-Williamsburg International (AC Term)	CM	114,860	137,000	137,000	201,300	22,140	22,140	86,440
Newport News-Williamsburg International (GA Term)	CM	25,000	25,000	25,000	25,000			
Norfolk International (AC Term)	CM	396,596	396,596	609,596	657,596		213,000	261,000
Norfolk International (GA Term)	CM	54,000	54,000	54,000	61,200			7,200
Richmond International (AC Term)	CM	293,706	293,706	547,947	547,947		254,241	254,241
Richmond International (GA Term)	CM	30,680	30,680	30,680	30,680			
Roanoke Regional (AC Term)	CM	96,000	96,000	96,000	96,000			
Roanoke Regional (GA Term)	CM	3,750	7,500	7,700	8,300	3,750	3,950	4,550
Ronald Reagan Washington National (AC Term) (5)	CM	1,159,490	1,159,490	1,159,490	1,159,490			
Ronald Reagan Washington National (GA Term)	CM	74,062	74,062	74,062	153,235			79,173
Shenandoah Valley Regional (AC Term)	CM	8,300	16,000	16,000	16,000	7,700	7,700	7,700
Shenandoah Valley Regional (GA Term)	CM	7,300	7,300	7,300	7,300			
Washington Dulles International (AC Term)	CM	1,917,000	1,917,000	2,103,560	4,262,980		186,560	2,345,980
Washington Dulles International (GA Term)	CM	1,320,831	1,320,831	1,320,831	1,320,831			
Chesapeake Regional	RL	2,920	5,800	6,000	6,500	2,880	3,080	3,580
Chesterfield County (2)	RL	8,400	8,400	8,400	8,400			
Hampton Roads	RL	5,577	7,300	7,400	7,700	1,723	1,823	2,123
Hanover County Municipal	RL	2,600	5,700	5,900	6,500	3,100	3,300	3,900
Leesburg Executive	RL	3,800	7,900	8,200	9,100	4,100	4,400	5,300
Manassas Regional	RL	18,500	18,500	18,500	18,500			
Stafford Regional (New)	RL	-	2,400	4,800	6,000	2,400	4,800	6,000
Warrenton-Fauquier	RL	4,800	6,300	6,500	7,200	1,500	1,700	2,400
Accomack County	GR	4,000	4,000	4,000	5,100			
Blue Ridge	GR	3,600	5,300	5,400	5,700	1,700	1,800	2,100
Culpeper County	GR	2,000	6,600	7,200	7,900	4,600	5,200	5,900
Danville Regional	GR	12,100	12,100	12,100	12,100			
Dinwiddie County Airport (3)	GR	6,600	6,600	6,600	7,300			
Farmville Regional	GR	1,800	3,300	3,600	4,300	1,500	1,800	2,500
Ingalls Field	GR	6,000	6,000	6,000	6,000			
Lonesome Pine	GR	4,000	4,000	4,000	4,000			

Table 10

Unconstrained Terminal Requirements Forecast

Airport Name	Service Role	Existing GA Terminal (sf)	2000	2005	2020	2000	2005	2020
			GA Terminal Required Area (sf)	GA Terminal Required Area (sf)	GA Terminal Required Area (sf)	Additional Terminal Area Recommended (1)	Additional Terminal Area Recommended (1)	Additional Terminal Area Recommended (1)
Mecklenburg-Brunswick Regional	GR	3,000	3,000	3,000	4,400			1,400
Middle Peninsula Regional	GR	2,000	3,700	4,300	5,600	1,700	2,300	3,600
New River Valley	GR	4,500	4,500	4,500	4,500			
Shannon	GR	5,640	7,200	7,200	7,400	1,560	1,560	1,760
Suffolk Municipal	GR	3,500	5,900	6,200	7,200	2,400	2,700	3,700
Tazewell County	GR	3,600	3,600	3,600	3,600			
Virginia Highlands	GR	9,000	9,000	9,000	9,000			
William M. Tuck (4)	GR	-	2,800	2,900	3,000	2,800	2,900	3,000
Winchester Regional	GR	9,000	9,000	9,000	9,000			
Blackstone Municipal	GC	1,200	2,400	2,400	2,400	1,200	1,200	1,200
Brookneal-Campbell County	GC	-	2,400	2,400	2,400	2,400	2,400	2,400
Emporia-Greenville Regional	GC	2,700	2,700	2,700	2,700			
Franklin Municipal	GC	3,800	3,800	3,800	3,800			
Front Royal-Warren County	GC	1,800	3,300	3,800	4,900	1,500	2,000	3,100
Lee County (New)	GC	-		2,400	3,100		2,400	3,100
Louisa County	GC	1,000	4,100	4,800	6,100	3,100	3,800	5,100
Luray Caverns	GC	1,000	2,400	2,400	2,400	1,400	1,400	1,400
Marks Municipal	GC	-	2,400	2,400	2,400	2,400	2,400	2,400
Mountain Empire	GC	2,000	3,400	3,500	3,700	1,400	1,500	1,700
New Kent County	GC	1,920	4,300	4,400	4,700	2,380	2,480	2,780
Orange County	GC	200	3,000	3,100	3,300	2,800	2,900	3,100
Tangier Island	GC	575	2,400	2,400	2,400	1,825	1,825	1,825
Twin County	GC	700	2,600	2,900	3,800	1,900	2,200	3,100
Virginia Tech	GC	6,890	6,890	6,890	6,890			
Wakefield Municipal	GC	2,880	3,500	4,200	5,600		1,320	2,720
Williamsburg-Jamestown	GC	7,327	5,200	5,600	6,200			
Tappahannock-Essex Co. (New)	GC	-	-	2,400	6,200		2,400	6,200

- 1) Assuming nominal deficiencies would not be remedied, this table reflects terminal deficiencies of 1200 square feet or greater.
- 2) A new 8,400 sf terminal building is under construction. Completion is expected late 2002.
- 3) Construction will begin on a new 6,600 sf terminal building in the fall of 2001.
- 4) The William Tuck terminal was destroyed by fire March 2001.
- 5) An expansion of Terminal A is planned during the 20-year planning horizon.

Source: HNTB Analysis

Table 11

Guidelines for Navigation and Landing Aids

Commercial Service (CM)

Precision Approach (200-1/2)
 High Intensity Runway Lights
 REILS (1) at all straight-in approaches
 AWOS III p/t (2) /ASOS (short-term)
 AWOS IV/ASOS (20-year)
 GCO/RTR (if airport does not have a control tower)
 Vertical Guidance Visual Aid (PAPI) on all runway ends

Reliever (RL)

Precision Approach (200-1/2)
 High Intensity Runway Lights
 REILS (1) at all straight-in approaches
 AWOS III p/t (2) /ASOS (short-term)
 AWOS IV/ASOS (20-year)
 GCO/RTR
 Vertical Guidance Visual Aid (PAPI) on all runway ends

General Aviation Regional (GR)

Non Precision Approach (300-1)
 Medium Intensity Runway Lights
 REILS (1) at all straight-in approaches
 AWOS III p/t (2) /ASOS (short-term)
 AWOS IV/ASOS (20-year)
 GCO/RTR
 Vertical Guidance Visual Aid (PAPI) on all runway ends

General Aviation Community (GC)

Non Precision Approach (400-1)
 Medium Intensity Runway Lights
 REILS (1) at all straight-in approaches
 Vertical Guidance Visual Aid (PAPI) on all runway ends

Local Service (LO)

Visual Approach
 Vertical Guidance Visual Aid (State System) on all runway ends

Notes:

1) REILS are runway end identification lights.

2) An AWOS III-P-T is an AWOS III with present weather and lightning detection.
 Please refer to the Weather Reporting section of the chapter for additional detail.

Source: DOAV and HNTB Analysis

Table 12

Precision Approach Capability Requirements

	Service Role	Approach Category	Design Group	Primary Runway	Existing Instrument Approach Capability (1)	Existing Instrument Approach Minima (1)	Desired Instrument Approach Capability (Type, Minimums)	Improvements Recommended
Charlottesville-Albemarle	CM	C	III	3/21	Precision	312-1	Precision	No
Lynchburg Regional	CM	C	III	4/22	Precision	200-1/2	Precision	No
Newport News-Williamsburg International	CM	D	III	7/25	Precision	200-1/2	Precision	No
Norfolk International	CM	D	V	5/23	Precision	200-3/8	Precision	No
Richmond International	CM	D	IV	16/34	Precision	200-1/2	Precision	No
Roanoke Regional	CM	D	IV	6/24	Precision	364-1	Precision	No
Ronald Reagan Washington National	CM	D	IV	1/19	Precision	200-3/8	Precision	No
Shenandoah Valley Regional	CM	C	III	5/23	Precision	200-1/2	Precision	No
Washington Dulles International	CM	D	V	1R/19L	Precision	200-1/2	Precision	No
Chesapeake Regional (2)	RL	C	II	5/23	Non-Precision	360-3/4	Precision	ILS
Chesterfield County	RL	C	II	15/33	Precision	200-1/2	Precision	No
Hampton Roads	RL	B	II	10/28	Non-Precision	380-1	Precision	ILS
Hanover County Municipal	RL	B	II	16/34	Non-Precision	355-1	Precision	ILS
Leesburg Executive	RL	C	II	17/35	Non-Precision	428-1	Precision	ILS
Manassas Regional	RL	C	II	16L/34R	Precision	250-3/4	Precision	No
Stafford Regional (New)	RL	C	II	15/33	Visual		Precision	ILS
Warrenton-Fauquier	RL	B	II	14/32	Non-Precision	637-1	Precision	ILS
Accomack County	GR	C	II	3/21	Non-Precision	373-1	Non-Precision (300-1)	Localizer
Blue Ridge	GR	B	II	12/30	Non-Precision	515-1	Non-Precision (300-1)	No
Culpeper County	GR	B	II	4/22	Non-Precision	507-1	Non-Precision (300-1)	Loc/NDB
Danville Regional	GR	C	II	2/20	Precision	341-1/2	Non-Precision (300-1)	No
Dinwiddie County Airport	GR	B	II	5/23	Non-Precision	427-1	Non-Precision (300-1)	No
Farmville Regional	GR	B	II	3/21	Non-Precision	403-1	Non-Precision (300-1)	Localizer
Ingalls Field	GR	B	II	7/25	Precision	315-1	Non-Precision (300-1)	No
Lonesome Pine	GR	C	II	6/24	Non-Precision	609-1	Non-Precision (300-1)	No
Mecklenburg-Brunswick Regional	GR	B	II	1/19	Non-Precision	318-1	Non-Precision (300-1)	No
Middle Peninsula Regional	GR	B	II	9/27	Non-Precision	496-1	Non-Precision (300-1)	Loc/NDB
New River Valley	GR	C	II	6/24	Precision	209-1	Non-Precision (300-1)	No
Shannon	GR	B	I	6/24	Non-Precision	495-1	Non-Precision (300-1)	Localizer
Suffolk Municipal	GR	C	II	4/22	Non-Precision	353-1	Non-Precision (300-1)	No
Tazewell County	GR	B	II	7/25	Non-Precision	528-1	Non-Precision (300-1)	No
Virginia Highlands	GR	B	II	6/24	Non-Precision	732-1	Non-Precision (300-1)	No
William M. Tuck	GR	B	II	1/19	Non-Precision	530-1	Non-Precision (300-1)	Loc/NDB
Winchester Regional	GR	C	II	14/32	Precision	259-1	Non-Precision (300-1)	No
Blackstone Municipal	GC	C	II	4/22	Non-Precision	427-1	Non-Precision (400-1)	No
Brookneal-Campbell County	GC	B	II	7/25	Non-Precision	583-1	Non-Precision (400-1)	No
Emporia-Greenville Regional	GC	B	II	15/33	Non-Precision	299-1	Non-Precision (400-1)	No

Table 12

Precision Approach Capability Requirements

	Service Role	Approach Category	Design Group	Primary Runway	Existing Instrument Approach Capability (1)	Existing Instrument Approach Minima (1)	Desired Instrument Approach Capability (Type, Minimums)	Improvements Recommended
Franklin Municipal	GC	B	II	9/27	Non-Precision	443-3/4	Non-Precision (400-1)	No
Front Royal-Warren County	GC	B	I	9/27	Visual		Non-Precision (400-1)	Yes
Lee County (New)	GC	B	II	6/24	None		Non-Precision (400-1)	No
Louisa County	GC	B	II	9/27	Non-Precision	387-1	Non-Precision (400-1)	No
Luray Caverns	GC	B	II	4/22	Non-Precision	1358-1 1/4	Non-Precision (400-1)	No
Marks Municipal	GC	B	II	4/22	Non-Precision	417-1	Non-Precision (400-1)	No
Mountain Empire	GC	B	II	8/26	Non-Precision	524-1	Non-Precision (400-1)	No
New Kent County	GC	B	I	10/28	Non-Precision	577-1	Non-Precision (400-1)	No
Orange County	GC	B	I	7/25	Non-Precision	674-1	Non-Precision (400-1)	No
Tangier Island	GC	C	II	2/20	Non-Precision	713-1	Non-Precision (400-1)	No
Tappahannock-Essex Co. (New)	GC	B	II	8/26	None		Non-Precision (400-1)	No
Twin County	GC	B	I	18/36	Non-Precision	367-1	Non-Precision (400-1)	No
Virginia Tech	GC	C	II	12/30	Non-Precision	341-1	Non-Precision (400-1)	No
Wakefield Municipal	GC	B	II	2/20	Non-Precision	727-1	Non-Precision (400-1)	No
Williamsburg-Jamestown	GC	B	II	13/31	Non-Precision	631-1	Non-Precision (400-1)	No
Bridgewater Air Park	LO	B	II	15/33	Non-Precision	1135-1 1/4	Visual	No
Chase City Municipal	LO	B	I	18/36	Non-Precision	694-1	Visual	No
Crewe Municipal	LO	B	I	15/33	Visual		Visual	No
Falwell	LO	A	I	10/28	Visual		Visual	No
Gordonsville Municipal	LO	B	I	5/23	Non-Precision	1038-1 1/4	Visual	No
Grundy Municipal	LO	B	I	4/22	Non-Precision	416-1	Visual	No
Hartwood Field	LO	A	I	17/35	Visual		Visual	No
Hummel Field	LO	B	II	18/36	Non-Precision	490-1	Visual	No
Lake Anna	LO	A	II	8/26	Visual		Visual	No
Lawrenceville-Brunswick	LO	B	I	18/36	Visual		Visual	No
Lee County	LO	B	II	7/25	Visual		Visual	No
Lunenburg County	LO	B	I	2/20	Visual		Visual	No
New London	LO	B	I	16/34	Visual		Visual	No
New Market	LO	B	I	6/24	Visual		Visual	No
Smith Mountain Lake	LO	B	I	5/23	Non-Precision	674-1	Visual	No
Tappahannock Municipal	LO	B	I	2/20	Visual		Visual	No
Waynesboro	LO	B	I	6/24	Visual		Visual	No

1) Approach data current as of 08/2001. Instrument approach minima includes decision height or minimum descent altitude (as appropriate) and visibility minimums. Criteria do not reflect approaches that require special aircrew and aircraft certification.

2) ILS/MALSR to be commissioned Spring 2002.

Source: HNTB Analysis

Table 13

Runway Lighting Requirements

Airport Name	Service Role	Primary Runway	Existing Runway Lights	Guideline for Runway Lights (1)	Improvements Recommended
Charlottesville-Albemarle	CM	3/21	HIRL	HIRL	No
Lynchburg Regional	CM	4/22	HIRL	HIRL	No
Newport News-Williamsburg International	CM	7/25	HIRL	HIRL	No
Norfolk International	CM	5/23	HIRL	HIRL	No
Richmond International	CM	16/34	HIRL	HIRL	No
Roanoke Regional	CM	6/24	HIRL	HIRL	No
Ronald Reagan Washington National	CM	1/19	HIRL	HIRL	No
Shenandoah Valley Regional	CM	5/23	HIRL	HIRL	No
Washington Dulles International	CM	1R/19L	HIRL	HIRL	No
Chesapeake Regional	RL	5/23	MIRL	HIRL	Yes
Chesterfield County	RL	15/33	HIRL	HIRL	No
Hampton Roads	RL	10/28	MIRL	HIRL	Yes
Hanover County Municipal	RL	16/34	MIRL	HIRL	Yes
Leesburg Executive	RL	17/35	MIRL	HIRL	Yes
Manassas Regional	RL	16L/34R	HIRL	HIRL	No
Stafford Regional (New)	RL	15/33	HIRL	HIRL	No
Warrenton-Fauquier	RL	14/32	MIRL	HIRL	Yes
Accomack County	GR	3/21	MIRL	MIRL	No
Blue Ridge	GR	12/30	MIRL	MIRL	No
Culpeper County	GR	4/22	MIRL	MIRL	No
Danville Regional	GR	2/20	HIRL	MIRL	No
Dinwiddie County Airport	GR	5/23	MIRL	MIRL	No
Farmville Regional	GR	3/21	MIRL	MIRL	No
Ingalls Field	GR	7/25	HIRL	MIRL	No
Lonesome Pine	GR	6/24	HIRL	MIRL	No
Mecklenburg-Brunswick Regional	GR	1/19	MIRL	MIRL	No
Middle Peninsula Regional	GR	9/27	MIRL	MIRL	No
New River Valley	GR	6/24	HIRL	MIRL	No
Shannon	GR	6/24	MIRL	MIRL	No
Suffolk Municipal	GR	4/22	HIRL	MIRL	No
Tazewell County	GR	7/25	MIRL	MIRL	No
Virginia Highlands	GR	6/24	MIRL	MIRL	No
William M. Tuck	GR	1/19	LIRL	MIRL	Yes
Winchester Regional	GR	14/32	MIRL	MIRL	No
Blackstone Municipal	GC	4/22	None	MIRL	Yes
Brookneal-Campbell County	GC	7/25	None	MIRL	Yes
Emporia-Greenville Regional	GC	15/33	MIRL	MIRL	No
Franklin Municipal	GC	9/27	MIRL	MIRL	No
Front Royal-Warren County	GC	9/27	MIRL	MIRL	No

Table 13

Runway Lighting Requirements

Airport Name	Service Role	Primary Runway	Existing Runway Lights	Guideline for Runway Lights (1)	Improvements Recommended
Lee County (New)	GC		None	MIRL	Yes
Louisa County	GC	9/27	MIRL	MIRL	No
Luray Caverns	GC	4/22	MIRL	MIRL	No
Marks Municipal	GC	4/22	MIRL	MIRL	No
Mountain Empire	GC	8/26	MIRL	MIRL	No
New Kent County	GC	10/28	MIRL	MIRL	No
Orange County	GC	7/25	MIRL	MIRL	No
Tangier Island	GC	2/20	None	MIRL	Yes
Tappahannock-Essex Co. (New)	GC		None	MIRL	Yes
Twin County	GC	18/36	MIRL	MIRL	No
Virginia Tech	GC	12/30	MIRL	MIRL	No
Wakefield Municipal	GC	2/20	None	MIRL	Yes
Williamsburg-Jamestown	GC	13/31	MIRL	MIRL	No

1) High Intensity Runway Lights (HIRL) are recommended for Commercial Service and Reliever airports. Medium Intensity Runway Lights (MIRL) are recommended for GA Regional and GA Community airports.

Source: HNTB Analysis

Table 14

RTR/GCO/RCO

Airport Name	Service Role	Existing GCO	Existing RTR	Existing RCO	GCO/RTR/RCO Improvement Recommended(1)
Charlottesville-Albemarle	CM			RCO	No
Lynchburg Regional	CM			RCO	No
Newport News-Williamsburg International	CM			RCO	No
Norfolk International	CM			RCO	No
Richmond International	CM			RCO	No
Roanoke Regional	CM			RCO	No
Ronald Reagan Washington National	CM			RCO	No
Shenandoah Valley Regional	CM				Yes
Washington Dulles International	CM			RCO	No
Chesapeake Regional	RL	GCO	RTR		No
Chesterfield County	RL		RTR		No
Hampton Roads	RL	GCO			No
Hanover County Municipal	RL		RTR		No
Leesburg Executive	RL	GCO	RTR		No
Manassas Regional	RL		RTR		No
Stafford Regional (New)	RL				Yes
Warrenton-Fauquier	RL	GCO			No
Accomack County	GR	GCO			No
Blue Ridge	GR		RTR		No
Culpeper County	GR	GCO			No
Danville Regional	GR			RCO	No
Dinwiddie County Airport	GR	GCO			No
Farmville Regional	GR	GCO			No
Ingalls Field	GR				Yes
Lonesome Pine	GR				No
Mecklenburg-Brunswick Regional	GR	GCO			No
Middle Peninsula Regional	GR			RCO	No
New River Valley	GR		RTR	RCO	No
Shannon	GR	GCO			No
Suffolk Municipal	GR	GCO			No
Tazewell County	GR	GCO			No
Virginia Highlands	GR			RCO	No
William M. Tuck	GR			RCO	No
Winchester Regional	GR		RTR		No
Blackstone Municipal	GC				No
Brookneal-Campbell County	GC				No
Emporia-Greenville Regional	GC				No
Franklin Municipal	GC	GCO			No
Front Royal-Warren County	GC				No

Table 14

RTR/GCO/RCO

Airport Name	Service Role	Existing GCO	Existing RTR	Existing RCO	GCO/RTR/RCO Improvement Recommended(1)
Lee County (New)	GC				No
Louisa County	GC				No
Luray Caverns	GC				No
Marks Municipal	GC				No
Mountain Empire	GC				No
New Kent County	GC	GCO			No
Orange County	GC	GCO			No
Tangier Island	GC			RCO	No
Tappahannock-Essex Co. (New)	GC				No
Twin County	GC	GCO			No
Virginia Tech	GC		RTR		No
Wakefield Municipal	GC			RCO	No
Williamsburg-Jamestown	GC	GCO			No

1) Ground Communication Outlets (GCO) or Remote Transmit Receive (RTR) are recommended for Commercial Service airports only if the airport is not served by an air traffic control tower. A GCO or RTR is also recommended at Reliever, and GA Regional airports.

Source: HNTB Analysis

Table 15

Vertical Guidance Visual Aids

Airport Name	Service Role	Primary Runway	Existing VGVA RW End 1	Existing VGVA RW End 2	VGVA Improvement Recommended (1)
Charlottesville-Albemarle	CM	3/21	None	VASI	Yes
Lynchburg Regional	CM	4/22	PAPI(P4L)	VASI(V4L)	Yes
Newport News-Williamsburg International	CM	7/25	None	VASI	Yes
Norfolk International	CM	5/23	PAPI(P4L)	PAPI(P4L)	No
Richmond International	CM	16/34	VASI(V4L)	None	Yes
Roanoke Regional	CM	6/24	VASI(V4L)	None	Yes
Ronald Reagan Washington National	CM	1/19	None	VASI(V12)	Yes
Shenandoah Valley Regional	CM	5/23	PAPI(P4L)	PAPI(P4L)	No
Washington Dulles International	CM	1R/19L	None	None	Yes
Chesapeake Regional	RL	5/23	PAPI	PAPI	No
Chesterfield County	RL	15/33	PAPI(P4L)	PAPI(P4L)	No
Hampton Roads	RL	10/28	APAP(PNIL)	APAP(PNIR)	Yes
Hanover County Municipal	RL	16/34	APAP(PNIL)	None	Yes
Leesburg Executive	RL	17/35	PAPI(P4L)	PAPI(P4R)	No
Manassas Regional	RL	16L/34R	PAPI(P4L)	PAPI(P4L)	No
Stafford Regional (New)	RL	15/33	PAPI	PAPI	No
Warrenton-Fauquier	RL	14/32	APAP(PNIL)	APAP(PNIL)	Yes
Accomack County	GR	3/21	PAPI	PAPI	No
Blue Ridge	GR	12/30	PAPI	PAPI	No
Culpeper County	GR	4/22	APAP(PNIR)	APAP(PNIL)	Yes
Danville Regional	GR	2/20	PAPI	PAPI	No
Dinwiddie County Airport (2)	GR	5/23	PAPI	PAPI	No
Farmville Regional	GR	3/21	PAPI(P2L)	PAPI(P2L)	No
Ingalls Field	GR	7/25	PAPI	PAPI	No
Lonesome Pine	GR	6/24	PAPI(P2L)	PAPI(P2R)	No
Mecklenburg-Brunswick Regional	GR	1/19	PAPI(P2L)	PAPI(P2L)	No
Middle Peninsula Regional	GR	9/27	None	None	Yes
New River Valley	GR	6/24	None	None	Yes
Shannon	GR	6/24	APAP(PNIL)	APAP(PNIL)	Yes
Suffolk Municipal	GR	4/22	PAPI(P4L)	PAPI(P4L)	No
Tazewell County	GR	7/25	None	PAPI(P2L)	Yes
Virginia Highlands	GR	6/24	None	None	Yes
William M. Tuck	GR	1/19	APAP(PNIL)	None	Yes
Winchester Regional	GR	14/32	PAPI (P2L)	PAPI (P2L)	No
Blackstone Municipal	GC	4/22	None	None	Yes
Brookneal-Campbell County	GC	7/25	None	None	Yes
Emporia-Greenville Regional	GC	15/33	PAPI	PAPI	No
Franklin Municipal	GC	9/27	APAP(PNIL)	VASI	Yes

Table 15

Vertical Guidance Visual Aids

Airport Name	Service Role	Primary Runway	Existing VGVA		VGVA
			RW End 1	RW End 2	Improvement Recommended (1)
Front Royal-Warren County	GC	9/27	None	None	Yes
Lee County (New)	GC	6/24	None	None	Yes
Louisa County	GC	9/27	PAPI(2L)	PAPI(2L)	No
Luray Caverns	GC	4/22	APAP(PNIL)	APAP(PNIL)	Yes
Marks Municipal	GC	4/22	None	None	Yes
Mountain Empire	GC	8/26	PAPI(P2L)	PAPI(P2L)	No
New Kent County	GC	10/28	PAPI(P2L)	PAPI(P2L)	No
Orange County	GC	7/25	PAPI(P2L)	PAPI(P2L)	No
Tangier Island	GC	2/20	None	None	Yes
Tappahannock-Essex Co. (New)	GC	8/26	None	None	Yes
Twin County	GC	18/36	APAP(PNIL)	APAP(PNIL)	Yes
Virginia Tech	GC	12/30	PVASI (PSIL)	PVASI (PSIL)	Yes
Wakefield Municipal	GC	2/20	APAP(PNIL)	APAP(PNIL)	Yes
Williamsburg-Jamestown	GC	13/31	APAP(PNIL)	APAP(PNIL)	Yes
Bridgewater Air Park	LO	15/33	Non-FAA VASI	Non-FAA VASI	No
Chase City Municipal	LO	18/36	None	None	Yes
Crewe Municipal	LO	15/33	APAP(PNIL)	APAP(PNIL)	No
Falwell	LO	10/28	n/a	VASI(P1)	No
Gordonsville Municipal	LO	5/23	APAP(PNIR)	APAP(PNIR)	No
Grundy Municipal	LO	4/22	APAP(PNIL)	APAP(PNIL)	No
Hartwood Field	LO	17/35	None	None	Yes
Hummel Field	LO	18/36	APAP(PNIR)	APAP(PNIL)	No
Lake Anna	LO	8/26	None	None	Yes
Lawrenceville-Brunswick	LO	18/36	APAP(PNIL)	APAP(PNIL)	No
Lee County	LO	7/25	APAP(PNIL)	APAP(PNIL)	No
Lunenburg County	LO	2/20	APAP(PNIL)	APAP(PNIL)	No
New London	LO	16/34	None	None	Yes
New Market	LO	6/24	None	None	Yes
Smith Mountain Lake	LO	5/23	None	None	Yes
Tappahannock Municipal	LO	2/20	APAP(PNIR)	APAP(PNIL)	No
Waynesboro	LO	6/24	None	None	Yes

1) A Vertical Guidance Visual Aid (VGVA) is recommended for all primary runway ends. A Precision Approach Path Indicator (PAPI) is recommended for all but Local Service airports, which may be served by a minimal State system.

2) PAPI's will be installed in the fall of 2001 as part of an overlay of the primary runway. The runway currently has a VASI (V2L) unit on each runway end.

Source: HNTB Analysis

Table 16

Runway End Identification Lights

Airport Name	Service Role	Primary Runway	Existing REIL RW End 1 (1)	Existing REIL RW End 2 (1)	Improvement Recommended
Charlottesville-Albemarle	CM	3/21	MALSR	REIL	No
Lynchburg Regional	CM	4/22	MALSR	REIL	No
Newport News-Williamsburg International	CM	7/25	MALSR	REIL	No
Norfolk International	CM	5/23	MALSR	MALSF/ REIL	No
Richmond International	CM	16/34	MALSR	ALSF2	No
Roanoke Regional	CM	6/24	MALSR	REIL	No
Ronald Reagan Washington National	CM	1/19	ALSF2	MALSF/ REIL	No
Shenandoah Valley Regional	CM	5/23	MALSR	REIL	No
Washington Dulles International	CM	1R/19L	ALSF2	MALSR	No
Chesapeake Regional	RL	5/23	ODALS	REIL	No
Chesterfield County	RL	15/33	REIL	MALSR	No
Hampton Roads	RL	10/28			Runway 10/28
Hanover County Municipal	RL	16/34	REIL	REIL	No
Leesburg Executive	RL	17/35	ODALS	REIL	No
Manassas Regional	RL	16L/34R	MALSR	REIL	No
Stafford Regional (New)	RL	15/33	REIL	REIL	No
Warrenton-Fauquier	RL	14/32			Runway 14
Accomack County	GR	3/21	REIL	REIL	No
Blue Ridge	GR	12/30	REIL	ODALS	No
Culpeper County	GR	4/22			Runway 22
Danville Regional	GR	2/20	MALSR	REIL	No
Dinwiddie County Airport	GR	5/23	ODALS	REIL	No
Farmville Regional	GR	3/21			Runway 3/21
Ingalls Field	GR	7/25		REIL	Runway 7
Lonesome Pine	GR	6/24	REIL	ODALS (NS)	No
Mecklenburg-Brunswick Regional	GR	1/19	REIL	REIL	No
Middle Peninsula Regional	GR	9/27			No
New River Valley (3)	GR	6/24	MALSR		Runway 24
Shannon	GR	6/24			Runway 24
Suffolk Municipal	GR	4/22	REIL	REIL	No
Tazewell County	GR	7/25	REIL	REIL	No
Virginia Highlands	GR	6/24			Runway 24
William M. Tuck	GR	1/19	REIL		No
Winchester Regional	GR	14/32	REIL	MALSR	No
Blackstone Municipal	GC	4/22			Runway 4/22
Brookneal-Campbell County	GC	7/25			No
Emporia-Greenville Regional	GC	15/33	REIL	REIL	No
Franklin Municipal	GC	9/27		ODALS	Runway 9

Table 16

Runway End Identification Lights

Airport Name	Service Role	Primary Runway	Existing REIL RW End 1 (1)	Existing REIL RW End 2 (1)	Improvement Recommended
Front Royal-Warren County	GC	9/27			No
Lee County (New)	GC	06/24	None	None	No
Louisa County	GC	9/27	REIL	REIL	No
Luray Caverns	GC	4/22			Runway 22
Marks Municipal	GC	4/22			Runway 4
Mountain Empire	GC	8/26	REIL	REIL	No
New Kent County	GC	10/28	REIL	REIL	No
Orange County	GC	7/25	REIL	REIL	No
Tangier Island	GC	2/20			Runway 2
Tappahannock-Essex Co. (New)	GC	8/26	None	None	No
Twin County	GC	18/36			Runway 18/36
Virginia Tech	GC	12/30	ODALS	REIL	No
Wakefield Municipal	GC	2/20			Runway 20
Williamsburg-Jamestown	GC	13/31	REIL	REIL	No

1) Runway end identification lights (REIL) are recommended for all straight-in approaches where no approach lighting system exists. Outlined cells reflect runways with a straight-in approach.

2) REIL will be installed at New River Valley in the Summer of 2002.

Source: HNTB Analysis

Table 17

AWOS/ASOS Requirements

Airport Name	Service Role	Existing Weather Reporting	Weather Reporting Improvement Recommended (5 year) (1)	Weather Reporting Improvement Recommended (20 year) (1)
Charlottesville-Albemarle	CM	ASOS	No	No
Lynchburg Regional	CM	ASOS	No	No
Newport News-Williamsburg International	CM	ASOS	No	No
Norfolk International	CM	ASOS	No	No
Richmond International	CM	ASOS	No	No
Roanoke Regional	CM	ASOS	No	No
Ronald Reagan Washington National	CM	ASOS	No	No
Shenandoah Valley Regional	CM	AWOS-3 P-T	No	Yes
Washington Dulles International	CM	ASOS	No	No
Chesapeake Regional	RL	AWOS-3	Yes	Yes
Chesterfield County	RL	AWOS-3	Yes	Yes
Hampton Roads	RL	AWOS-3	Yes	Yes
Hanover County Municipal	RL	ASOS	No	No
Leesburg Executive	RL	AWOS-3	Yes	Yes
Manassas Regional	RL	AWOS-3	Yes	Yes
Stafford Regional (New)	RL	AWOS-3	Yes	Yes
Warrenton-Fauquier	RL	None	Yes	Yes
Accomack County	GR	AWOS-3	Yes	Yes
Blue Ridge	GR	AWOS-3	Yes	Yes
Culpeper County	GR	AWOS-3	Yes	Yes
Danville Regional	GR	ASOS	No	No
Dinwiddie County Airport	GR	AWOS-3	Yes	Yes
Farmville Regional	GR	AWOS-3	Yes	Yes
Ingalls Field	GR	AWOS-3	Yes	Yes
Lonesome Pine	GR	AWOS-3	Yes	Yes
Mecklenburg-Brunswick Regional	GR	AWOS-3	Yes	Yes
Middle Peninsula Regional	GR	None	Yes	Yes
New River Valley	GR	AWOS-3	Yes	Yes
Shannon	GR	AWOS-3	Yes	Yes
Suffolk Municipal	GR	AWOS-3	Yes	Yes
Tazewell County	GR	AWOS-3	Yes	Yes
Virginia Highlands	GR	AWOS-3	Yes	Yes
William M. Tuck	GR	None	Yes	Yes
Winchester Regional	GR	AWOS-3	Yes	Yes

Table 17

AWOS/ASOS Requirements

Airport Name	Service Role	Existing Weather Reporting	Weather Reporting Improvement Recommended (5 year) (1)	Weather Reporting Improvement Recommended (20 year) (1)
Blackstone Municipal	GC	None	n/a	n/a
Brookneal-Campbell County	GC	None	n/a	n/a
Emporia-Greenville Regional	GC	AWOS-3	n/a	n/a
Franklin Municipal	GC	AWOS-3	n/a	n/a
Front Royal-Warren County	GC	None	n/a	n/a
Lee County (New)	GC	None	n/a	n/a
Louisa County	GC	AWOS-3	n/a	n/a
Luray Caverns	GC	None	n/a	n/a
Marks Municipal	GC	None	n/a	n/a
Mountain Empire	GC	AWOS-3	n/a	n/a
New Kent County	GC	None	n/a	n/a
Orange County	GC	AWOS-3	n/a	n/a
Tangier Island	GC	None	n/a	n/a
Tappahannock-Essex Co. (New)	GC	None	n/a	n/a
Twin County	GC	AWOS-3	n/a	n/a
Virginia Tech	GC	AWOS-3	n/a	n/a
Wakefield Municipal	GC	ASOS	n/a	n/a
Williamsburg-Jamestown	GC	AWOS-3	n/a	n/a

1) For Commercial Service, Reliever, and GA Regional airports, AWOS-3 p/t or ASOS is recommended by 2005. AWOS-4 or ASOS is recommended by 2020.

Source: HNTB Analysis